AN EXPERIMENTAL STUDY TO ANALYZE THE EFFECTS OF SELF STRETCHING AND POSTURAL RE EDUCATION PROGRAM FOR CLASSICAL CARNATIC VIOLIN ARTISTES IN REDUCING PLAYING RELATED MUSCULOSKELETAL DISORDER(PRMD)OF CERVICAL FLEXOR MUSCLE GROUP

Registration No - 271410224

This Dissertation is submitted to,

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY, CHENNAI

In partial fulfilment for the requirements of the degree of

MASTERS OF PHYSIOTHERAPY

Speciality : Advanced Orthopaedics in Physiotherapy,

April 2016

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BONAFIDE CERTIFICATE

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CERTIFICATE

This is to certify that the project titled "**AN EXPERIMENTAL STUDY TO ANALYZE THE EFFECTS OF SELF STRETCHING AND POSTURAL RE EDUCATION PROGRAM FOR CLASSICAL CARNATIC VIOLIN ARTISTES IN REDUCING PLAYING RELATED MUSCULO SKELETAL DISORDER(PRMD)OF CERVICAL FLEXOR MUSCLE GROUP"** is a bonafide of work done under the guidance and supervision in the partial fulfillment for the degree of **MASTER OF PHYSIOTHERAPY(MPT)**April 2016 by Mr.R.Srinath (Register No 271410224) Post graduate student of **MADHA COLLEGE OF PHYSIOTHERAPY**,Kundrathur,Chennai-69.

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ACKNOWLEDGEMENT

I express my gratitude to Almighty for His abundant grace and mercy that has made me to succeed in life.

I express my gratitude to my family members for their outstanding support,sacrifice and prayers that has enabled me to spell success in life.

I am grateful to the chairmen Dr.S.PETER and management of the Madha Education Trust for providing me an opportunity to pursue my Post Graduation.

I sincerely thank our Beloved Principal **PROF.VIJAY KRISHNA.,M.P.T.,M.I.A.P** for his valuable suggestion and constant support.

Reserving the best for the last, I wish to thank my Guide **MRS.S.SANGEETHA,M.P.T(ORTHO),M.I.A.P.,** Assistant Professor ,Madha College of Physiotherapy, For her stupendous support and valuable knowledge sharing in completing my work. She has extended his precious time for innumerable project discussions& guidance, for which i owe her a lot.

I also wish to thank **Prof. S.NAGARAJ, MPT, MIAP, PGDCE** and **Prof. Mr. ALWIN BRIGHT VICTOR, M.P.T., MIAP** for their ideas and support

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CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION

Indian classical carnatic musicians can be segmented as vocalist, percussionist and stringed instrument players. On an Average, A traditional carnatic music concert is performed over a duration of two hours[1]. In the involvement to give the best performance, String instrument player (Violinists) adopt a poor posture during the concert & pre dispose themselves to muscular fatigue/Pain in short term & degenerative conditions in long term. And not just that, even for a seasoned performing artist, it takes hours of vigorous training & rehearsals prior to a scheduled concert, Hence, Training sessions must also be considered as a pre-disposing factor that attributes to the mental & physical stress of the musicians(A.steinmetz&colles et al -Euro J. Phys Med 2012)[2]. Thus the term, ”Playing Related Musculoskeletal Disorder(PRMD)” was coined to address the collective occupational hazard faced by the musicians/Performing artists at large(Christine zaza&cathycharles 1998). There are numerous study articles in the literature that defines the terminology "PRMD"(AlyczaMusumzi 1998) & its prophylactic management through preventive interventions.
A.Steimetz et al[2] defines PRMD as "A spectrum of Joint Movement restriction, Musculoskeletal pain or bodily discomfort experienced by the musicians following to their performance, that are rarely reported by them and that which cannot be clinically diagnosed instantly". However, the study sample chosen were western musicians, with interventions & management catering to their specific needs desired. There is a dearth of literature knowledge to define the concept of PRMD and its associated influence on performing artists from an Indian population perspective, Especially, Specific studies to conceptualize the terminology among southern classical musicians is the need of the hour. Owing to a broad range of traditional & classical instruments played individually/collectively on a musical troupe for a given performance, Scope of studying ergonomic behaviour among performing artistes has huge potential& needs many more explorative literature studies in the days to come.

Evolution of Indian Music is phenomenal in the past century, with carnatic music becoming more popular among the international audience and trending fusion music has opened doors for many promising artistes to perform on world stage. For any performing musician from southern India, what is looked upon as hobby playing has now become a promising career to many brooding youngsters, who opt & dedicate their focus in shaping themselves as a Music professional. Adding

fortune to it, Many reality shows have drawn attention & attraction for budding musicians in creating newer opportunities. Tamil month "Margazhi" is becoming famous internationally, as it is the time when dedicated classical carnaticmusic concerts take place at Tamilnadu and Chennai in specific. The whole Month is power packed with the musical performances from Leading musical Stalwarts on a tight schedule. The very same opportunity has also changed equations among musicians, with more mental stress & physical strain levied upon them. In personal interviews of Musical Legends like Dr.Balamurali Krishna, Dr.K.J.Yesudas,Dr.Kadrigopalnath, Dr.L.Subramanaiam etc., they have admitted physical & mental stress experienced by them around the musical season(Newsletter from Carnatic times, issue dated November,2013)[4] .However, there is no proper study or documentation about their exact experience on physical health associated to musical performance. Literature reference identifies & quotes any mild musculoskeletal pain or bodily discomfort, limitation of movement experienced by any musicians following a concert or practise can be classified as the sign of "Playing related musculoskeletal disorder"(Jackie Barshart et al 2013,BMJ,Performing arts edition)[14].

There is also a systematic review study carried out by Varuthose et al(Journal of Physical and Psychological Rehabilitative Medicine, Elselvier 2009) that quotes that anxiety levels of the musicians while approaching concerts has a negative relationship with PRMD[13].

Although performing arts medicine is a growing field, the health problems of musicians remainunder-recognized and under-researched.(Steinmedz et al 2012)[5]. India, with its biggest strength of having highest youth population , Sound health & Productivity among the young population is a much needed trait for a sustained growth of our country.

The current topic is hence chosen to identify the effect of self stretching& posture correction in reducing the effects of PRMD on cervical flexor muscle group among classical carnatic Violinists. Biomechanical analysis of stringed instrument players has been carried out in western population and many contemporary methods in establishing the relationship between musicians and playing related musculoskeletal disorder has been Published(ChritineZaza Systematic Review CMAJ, APR21,1998)[6]. However, since this particular study is contemporary for classical carnatic violonists& Indian performing arts medicine study literature at large, it is intended to be carried out by taking a collective study references from multiple topic related Evidence based study articles carried out on western population than a single mother article.

1.2 STATEMENT OF THE STUDY

Effects of self stretching& posture correction in reducing PRMD on cervical flexors among classical carnatic violinists

1.3 NEED FOR THE STUDY

In India, Performing arts Medicine is not even at its infancy, with a very poor awareness among performing artistes and medical/Para-medical practitioners who attend them for their medical needs.

Role of a physical therapist is not just about rehabilitating the musician from a particular ailment, but also to act as a catalyst in injuriesprevention and thereby reducing the vulnerability to any musculoskeletal disorder on a longer run.

Majority of the studies published on musicians &performing artists are western with very minimal studies on Asian population. Given the centuries old tradition & fame for Indian Classic Music, There is almost zilch study addressing specific playing related musculoskeletal disorders on classic carnatic musician/ violinist. Therefore, need of this study is much wanted and has even greater scope in future by extending its avenue and address the specific needs of other musicians like Mridangam, Nadhaswaram , Veena players exclusively belonging to Indian Classical Music Fraternity. This study would indeed open the flood gates of much wanted literature research that are indigenous to Indian Musician population and ones that can be scaled to International literature standard.There are articles in literature that defines about "PRMD", it's signs and symptoms among violinists(Moraes GFS, Pappini AA, 2012)[7].

1.4 AIM OF THE STUDY

The purpose of this study was to determine the impact of self stretching and postural re education in reducing Playing related musculoskeletal disorder of cervical flexor muscle group among classical carnatic Violinists.

1.5 OBJECTIVE OF THE STUDY:

- To find out effects of self stretching in reducing stiffness & improving Range of motion

- To find out the influence of postural re education in reducing playing related musculoskeletal disorder of Cervical flexor muscle group among classical carnatic violinists.

1.6 OPERATIONAL DEFINITIONS

A. Classical carnatic Music: It is one of two main subgenres of Indian classical music that evolved from ancient Hindu traditions. Carnatic music is usually performed by a small ensemble of musicians, consisting of a principal performer (usually a vocalist), a melodic accompaniment (usually a violin), a rhythm accompaniment (usually a mridangam), and a tambura, which acts as a dronethroughout the performance. Other typical instruments used in performances may include the ghatam, kanjira, morsing, venu flute,veena, and chitraveena.(Wikipedia)

B. *Violinists*:The violin is a string instrument&has four strings tuned in perfect fifths, and is most commonly played by drawing a bow across its strings. The violin is played either seated or standing up. The standard way of holding the violin is with the left side of the jaw resting on the chinrest of the violin, and supported by the left shoulder, often assisted by a shoulder rest (or a sponge and an elastic band for younger players who struggle with shoulder rests). The jaw and the shoulder must hold the violin firmly enough to allow it to remain stable when the left hand goes from a high position to a low one. (In the Indian posture the stability of the violin is guaranteed by its scroll resting on the side of the foot).[8]

C. Self stretching : A form of physical exercise performed by a person to his own body, in which a specific skeletal muscle is deliberately elongated to its fullest length(Carolyn Kisner)[9]

D. Postural Re-education :Reforming or rehabilitating the physical appearance of the body through education and training.[8]

E. PRMD : Playing related musculoskeletal disorderrelates to music playing among classical musicians that result in painful, chronic and disabling conditions. Due to high physical and psychological demands of their profession, musicians can experience Musculoskeletal disorders. (Cathy Charles[c, d], AlicjaMuszynskiVolume 47, Issue 12, December 1998, Pages 2013–2023)[9]

F. Cervical Flexor Muscle group :These are a group of muscles that are responsible for forward bending and side-bending of the neck. These muscles are also very important for supporting the weight of the head against gravity and stabilizing the neck during various body movements(Cynthia Norkins)[10].

1.7 HYPOTHESIS

Alternate hypothesis:

There will be a significant difference in reduction of PRMD in cervical flexor muscle group among classical carnatic violinists following to self stretching and postural re- education.

Null hypothesis:

There will be no significant difference in reduction of PRMD in cervical flexor muscle group among classical carnatic violinists following to self stretching and postural re- education.

CHAPTER - 2

REVIEW OF LITERATURE

2.0 REVIEW OF LITERATURE

1. Geraldo Fabiano Se SuzaMoraes,AdrianaPapiniAntuines(2012)

Studied "Musculoskeletal Disorders in Professional Violinists and Violists- Systematic Review" and suggested that violinists& violists suffer from conditions in the jaw,neck,shoulder and hands. They studied articles, theses and dissertations sought in Medline,Lilacs,Cochrane and scielo databases and concluded that due to prolonged flexion of the head and shoulder required to hold the violin, neck, shoulder and temporomandibular joint are the most commonly affected areas.

2. Irina Foxman, MS, RN, ANP, and Barbara J. Burgel, MS, RN, COHN-S, FAAN(2005)

Studied "Musician Health and Safety Preventing Playing-Related Musculoskeletal Disorders" and suggested that Playing-related musculoskeletal disorders arise from repetitive, awkward postures while playing, and postural stress from prolonged sitting. The clinical findings of 10 musicians are summarized, focusing on playing-related musculoskeletal disorders. Tendon gliding exercises and other preventive measures used in the educational intervention are summarized for
use by occupational health nurses.

3. A.Steinmetz, moller(EUR J PHYS REHABL MED 2012)

Studied "Playing related Musculoskeletal disorders in music students- associated musculoskeletal signs", a prospective, cross sectional,case control and non randomized study among 55 musicians & found 81% experienced PRMD with a higher amount of musculoskeletal dysfunction..Screening may identify musicians at risk and early treatment may prevent PRMD in musicians.

4. Barbara Paull,christineharrison(scarecrow press,1997)

Wrote a book"The Athlete Musician: A guide to playing without pain" about injury prevention for musicians and has mentioned that 43% of music professionals have experienced PRMD with neck and shoulder injury remaining as a major cause.

5. Helence M paarup, JesperBaelum,ClausManniche(BMC Research notes studies 2012)

Studied "Occurrence and co-existence of localized Musculoskeletal symptoms and findings in work attending orchestra musicians- an explanatory cross sectional study" among 441 musicians from 6 Danish symphony orchestra states existence of symptoms.

6. Christine Zaza, Cathy Charles and Alicja(1998 Elsevier Science Ltd.)

Published the article" The Meaning of Playing related Musculoskeletal disorders to Classical musicians" and concluded that PRMDs are personal, chronic and disabling health problems that affect the whole person, physically, emotionally, occupationally, and socially.

7. Peter f. Ostwald, md; barry c. Baron, md; nancy m. Byl, mph, pt, phd; and frank r. Wilson, MD, San Francisco, California(1994)

In his publication at a conference for "performing arts medicine" quoted that Various musculoskeletal problems can result from the repetitive movements required of instrumentalists.Aching, burning, fullness, tiredness, or pain in one ormore body parts involved in playing the instrument areusually the initial symptoms. These problems commonly develop after an unusually intense or prolonged period of practicing and performing, often of difficult repertoire,sometimes on a different or unfamiliar instrument.

8. Cliffton Chan,1 Tim Driscoll,2 Bronwen Ackermann(2012 BMJ)

"Development of a specific exercise programme for professional orchestral musicians". Study states that, Exercise is suggested to help in reducing work related upper limb disorders and accordingly a trial of a specific exerciseprogramme for this population was planned. Among the detailed exercise schedule, Stretches to cervical neck flexors were also included to evaluate its effectiveness in addressing the incidence and intensity of PRMDs, and changesto the musicians' playing postures and effort levels.

9.Han-Sung Lee, Ho Youn Park, Jun O Yoon, Jin Sam Kim(2013,Clinical journal of orthopeadics)

Published "Musicians' Medicine: Musculoskeletal Problems in String Players" and found that string players have the highest prevalence of musculoskeletal problems. This paper examines the various positions and movements of the upper extremities in string players: 1) basic postures for holding instruments, 2)movements of left upper extremity: fingering, forearm posture, high position and vibrato, 3) movements of right upper extremity: bowing, bow angles, pizzicato and other bowing techniques. It also concludes that, These isotonic and isometric movements can lead to musculoskeletal problems in musicians. The prevalence of musculoskeletal disorders in instrumentalists is relatively high, ranging from 73.4% to 87.7%.

10.C. Chan, T. Driscolland B. Ackermann(Occupational Medicine Access,2013)

Studied "Exercise DVD effect on musculoskeletal disordersin professional orchestral musicians" and stated that, One hundred and forty-four out of 576 musicians volunteeredsessions over the 12 week period and Participants reported benefits of the DVD on strengthening muscles, increasing ease of movement and improving flexibility related to playing. Study concluded that, An exercise DVD was well received and appeared to be effective, convenient and safe in managing occupational-specific musculoskeletal disorders in musicians

11. Cliffton Chan, Tim Driscoll and BronwenAckermann(BMC 2013)

Studied "The usefulness of on-site physical therapy-led triage services for professional orchestral musicians – a national cohort study". As per the study, Eight triage sessions were run on a fortnightly basis during a designated lunch break between rehearsal calls in seven premier symphony orchestras in Australia; a total population of 483 musicians. The participants received one or a combination of: a) education and advice relating to their provisional diagnosis, b) basic acute
management and/or c) a referral to a suitable medical practitioner or allied health professional for further consultation or treatment. A three-month follow-up questionnaire was completed and a qualitative narrative themes-based analysis was undertaken to summarise participant and physical therapist feedback. Uptake, participant satisfaction and factors influencing attendance were measured. Results and conclusion stated that, On-site health services for musicians may facilitate better injury management by providing immediate and specific health advice.

12. Christine Zaza, PhD(CMAJ,1998)

"Playing-related musculoskeletal disorders in musicians: a systematicreview of incidence and prevalence" and quoted that, Work-related musculoskeletal disorders cause pain, disability and loss of employment for many workers, including musicians. Seven databases were searched for the period 1980 to 1996. The main textbook and performing arts medicine journals were searched manually, as were reference lists of all relevant papers. The best estimates of PRMD prevalence were derived from the 3 studies that excluded mild complaints; these studies indicated that PRMD prevalence was 39% and 47% in adults and 17% in secondary school music students respectively.

13. Laura M Kok, Theodora PM VlietVlieland, Marta Fiocco and Rob GHH Nelissen(BMC 2013)

Studied "A comparative study on the prevalence of musculoskeletal complaints among musicians and non-musicians" and has concluded saying, Musculoskeletal complaints are significantly more common among musicians compared tonon-musicians, mainly due to a higher number of upper extremity complaints

CHAPTER - 3

MATERIALS & METHODOLGY

3.0 MATERIALS AND METHODOLOGY

3.1 Study Design:

Experimental study design

3.2 Sampling :

40 Eligible violinists from Harish Raghavendra School of Music, West Mambalam, Chennai were selected, of which, 10 violinists chose not to participate.

3.3 Sample Design:

Convenient sampling method.

3.4 Sample Size:

30 young Violinists between the age group of 15 - 25 years

Group 1:

15 Violinists performing for practice rehearsals conventionally without any intervention.

Group 2:

15 Violinists performing for practice rehearsals with trained self stretches to cervical flexor muscle and instructions on posture correction before the start .

3.5 Participants

Violinists were recruited for the study between 28-30th November 2015, at HARISH RAGHAVENDRA SCHOOL OF MUSIC,WEST MAMBALAM,CHENNAI.

3.6 Inclusion Criteria:

Violinists with a learning experience for minimum 5 years & capable of performing keerthanais(Krithi)

- Age group : 15-25 years
- Gender : Both sex
- Violinists who are capable of giving a full pledged concert including thaniyavardanam
- Violinists who has similar playing technique learnt from the same teacher.

3.7 Exclusion Criteria

- Beginners and rookie
- Age group : < 15 years and > 25years
- Violinists who has a known history of congenital Musculoskeletal anomaly.
- Subjects who have undergone recent surgeries
- Subjects with any form of illness on the day of assessment & data collection.
- Subjects with any recent musculoskeletal trauma like fracture, Muscle sprain or cramps.

3.8Independent Variable:

- Self Stretching
- Postural Re-education.

3.9 Dependent Variable:

Improved Range of Motion on Cervical Flexor Muscles and Reduced Anxiety levels on musicians

***3.10 Outcome Measures*:**

- Range of Motion(In Degrees) through Manual Goniometry
- MPAI(Music Performance Anxiety Inventory)

3.11 Materials Used For Assessment &Intervention:

- Manual Goniometer
- Camera recorder
- Measuring tape
- Work sheet
- Floor mat
- Stationeries

3.12 Research procedure:

Thirty subjects who fulfilled the inclusion criteria and given the consent to participate in the study was taken with approval of ethical committee in Madha Medical College and Hospital. They were assigned into two groups by random allocation method. For both the groups, Initial Range of motion measurement(In Degrees) for cervical flexion were taken with Manual Goniometer & data was documented .

MEASUREMENT OF CERVICAL FLEXION THROUGH GONIOMETRY

Procedure for performing self stretch:

Violinists belonging to experimental group were told orally about brief anatomy of neck and significance of self stretching. They were also taught and demonstrated to do self stretch of neck(cervical) flexors .Violinist were also shown aYou tube video on Self stretch published by Manual Therapy association, Indianapolis[17]. Finally,At the end of their playing session, experimental group were also taught & trained to do cool down exercises that involved mobility exercises & mild stretching of neck muscles.

DEMONSTRATING THE PROCEDURE OF PERFORMING CERVICAL FLEXOR SELF STRETCH

Procedure for performing posture re-education:

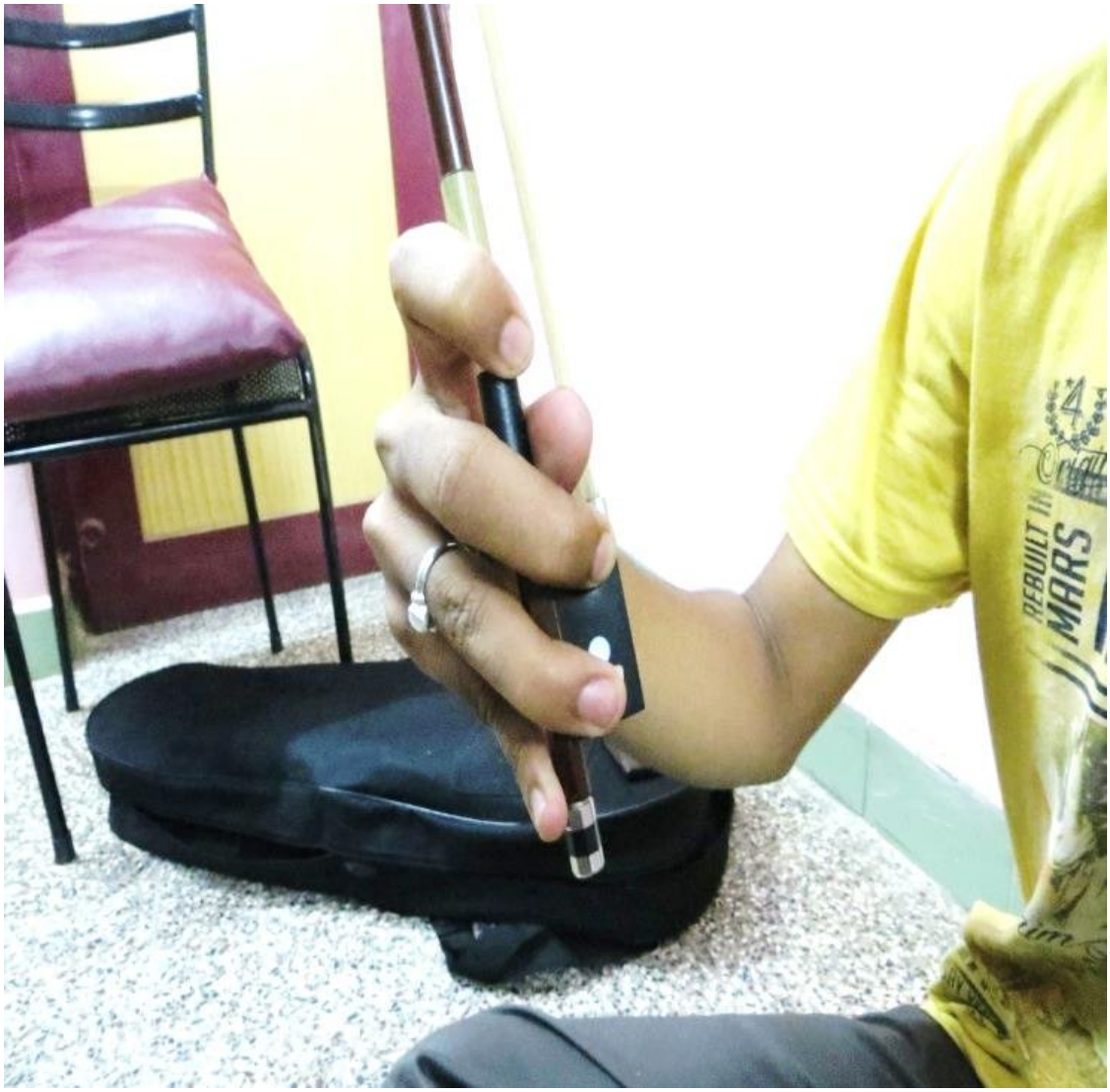
All the subjects under experimental group were made to perform and visually observed for the method of playing & posture they adopted while playing. In available cases, Video of their performance in earlier concerts were analyzed.

TRAINING TO MUSICIANS IN ADOPTING CORRECT POSTURE WHILE PLAYING

In Broad, Posture corrective inputs were given to ensure following aspects,

- Keep the spine erect while playing, cueing technique for reminder like, after finishing every note, remember to straighten your spine, were taught & trained.
- Minimal cervical flexion by elevating the thigh with a pillow or folded cloth & keeping the chin holder of violin as high as possible.
- While bowing, play without shoulder abduction (arm separation)

Finger holding position of the bow is also taught to play the instrument with ease



Advise on Avoiding typical cross legged sitting Posture and Resting the Violin on the ankle joint without pressure

Following to the corrective advise& self stretching by the experimental group and conventional playing method by the control group, both the groups did continuous playing of Violin for 7 Hours with two breaks for twenty minutes each. Practise session was performed in group for their upcoming concert, Hence, time duration of practise, instrument, rehearsal environment is exactly the same for both groups without any bias.

At the end of the 7 hours practise session, both the groups were asked to fill out the MPAI questionnaire and in the mean while post-test goniometric values on cervical flexion were measured and documented for both groups respectively.

CHAPTER-4

STATISTICAL ANALYSIS

4.0 STATISTICAL ANALYSIS AND RESULTS

The outcome values obtained were tabulated in Microsoft Excel 10 spread sheet, and were exported to SPSS Statistics 17.0 version for Windows 7 for statistical analysis.

The effects of the intervention on the Range of Motion of Cervical flexors from pre to posttest values in both groups were analyzed using Paired 'T' Test for within group analysis and Independent Sample 'T' test for between Group analyses.

The P value was chosen as per the description given by SPSS Statistics for Windows 7 Ultimate Version.

Description of P value

P value	Description	Summary
< 0.001	Extremely Significant	***
0.001 to 0.01	Very Significant	**
0.01 to 0.5	Significant	*
> 0.05	Not Significant	NS

FORMULAE:

1. Mean X= $\frac{\sum ?}{?}$

2. Standard Deviation SD =? $\sqrt{\frac{\sum(? - ? 1)2}{n-1}}$

3. Paired "t"test = $\frac{\bar{d}\sqrt{?}}{??}$

$$s_d = \sqrt{\frac{\sum(d-\bar{d})^2}{n-1}}$$

$$\bar{d} = \frac{\sum d}{n}$$

Where,

n = number of samples SD =Standard deviation D = Mean difference

4. Independent t –test t cal = $\frac{(?1 - ?2)}{??}$

$$SE = S? \sqrt{\frac{1}{?1} + \frac{1}{?2}}$$

Where $S = SE\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$

n 1,n 2 = Size of the samples of two groups

ESCRIPTIVES

CERVICAL FLEXION- RANGE OF MOTION(In Degrees)

Table 4.1

Comparison of Pre and Post test value of Group- A

S.No	Variable	PRE- TEST			POST - TEST		
		Mean	SD	SEM	Mean	SD	SEM
1	Range of Motion	49.9	2.4	.628	49.33	2.6	.695

When violinists performed their rehearsals conventionally without any intervention, there is a minimal and skewed difference of pre test mean value of 49.9 with a standard deviation value of 2.4 in comparison to the post test mean value of 49.3 with a standard deviation of 2.6.This difference can be attributed to the mild playing related musculoskeletal strain on cervical flexors experienced by the subjects.

Table 4.2

Comparison of Pre and Post test value of Group- B

S.No	Variable	PRE- TEST			POST - TEST		
		Mean	SD	SEM	Mean	SD	SEM
1	Range of Motion	50.2	2.36	.611	51.8	2.6	.696

When violinists performed their rehearsals with Posture re education & trained self stretches to cervical flexors, there is a comparatively striking difference of pre test mean value of 50.2 with a standard deviation value of 2.36 to that of Post test mean value of 51.8 with a standard deviation of 2.6. This difference can be attributed to the effect of self stretches& postural re education on cervical flexors of the subjects.

PAIRED DIFFERENCE BETWEEN THE GROUPS

Table 4.3

Group-A

S. No	Variable	Mean	Sd	Sem	95% confidence interval of the difference Lower	Upper	Df	T value	Sig (2tailed)
1	Pre & Post test Range of Motion(In Degrees)	.600	.910	.235	0.96	1.104	14	2.553	.023

When subjects on Group-A were made to play conventionally without any intervention, Mean value is .600 with a SD value of .910.At 95% confidence interval of the difference,14 and 't" value 2.553.The above readings shows the transition of difference in the reading values prior and post-performance.

Table 4.4

Group-B

95% confidence interval of the difference

S.no	Variable	Mean	Sd	Sem	Lower	Upper	Df	T value	Sig (2tailed)
1	Pre & Post test Range of Motion(In Degrees)	-1.667	2.992	.773	-3.324	-0.10	14	-2.157	.049

Paired samples test to determine Cervical flexors - Range of Motion(In degrees), when done on subjects belonging to Group-B, with Trained self stretches& Postural Re education, Mean value is -1.667 with a SD value of 2.992.At 95% confidence interval of the difference,14 and 't" value - 2.157.The above readings shows the transition of difference in the reading values prior and post performance.

Table 4.5

Music Performance Anxiety Index(MPAI)

S.No	Variable	Group – A			Group – B		
		Mean	SD	SEM	Mean	SD	SEM
1	MPAI	30.93	1.8	.483	28.2	1.4	.368

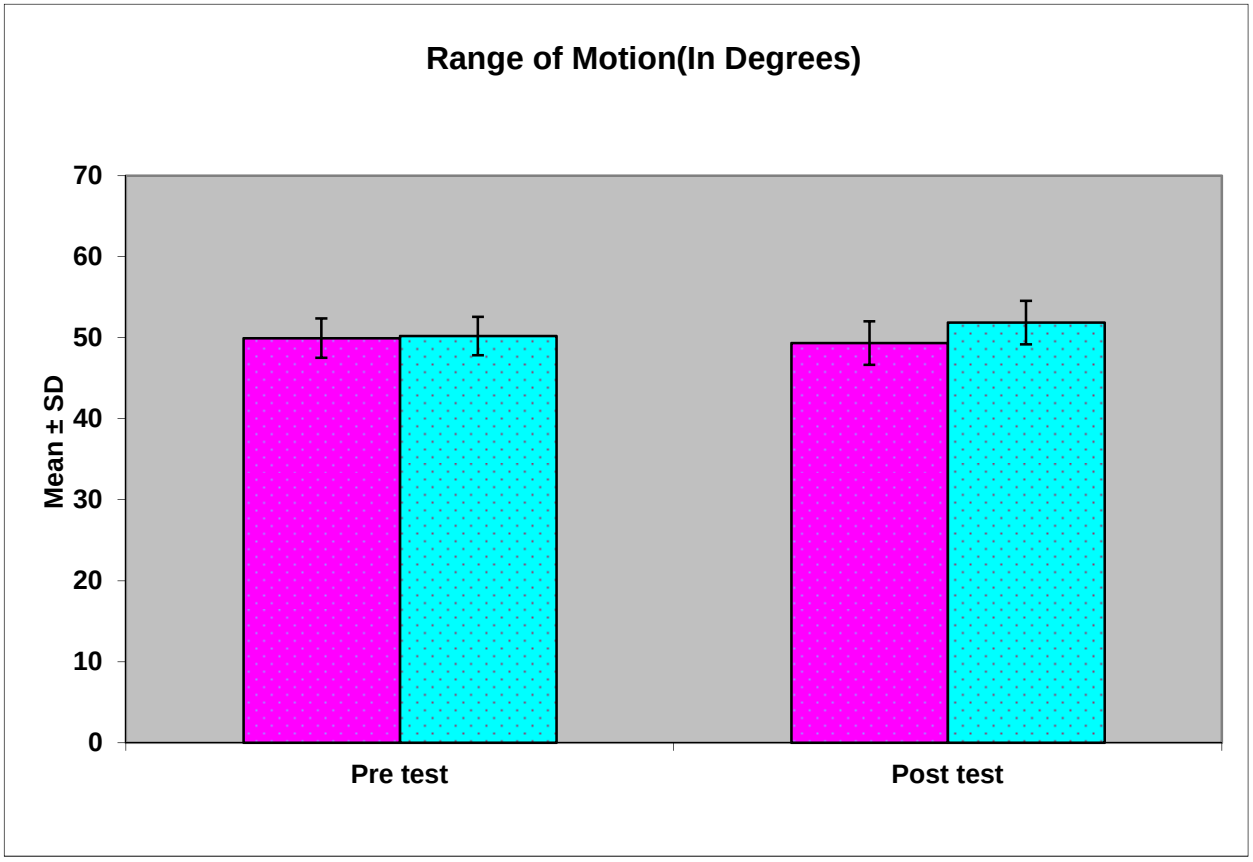
Music Performance anxiety index is 12 point objective questionnaire filled by the candidates one hour later to the time of assessment, to understand their psychological impact on PRMD. Group-A without intervention showed a mean of 30.93 with a standard deviation of 1.8, whereas, Group-B that underwent self stretching and posture re-education, showed a decreased mean of 28.2 with a standard deviation of .368 implying that group-B musicians display lesser anxiety levels.

GRAPHS

GRAPH-1

RANGE OF MOTION FOR CERVICAL FLEXORS(IN DEGREES)

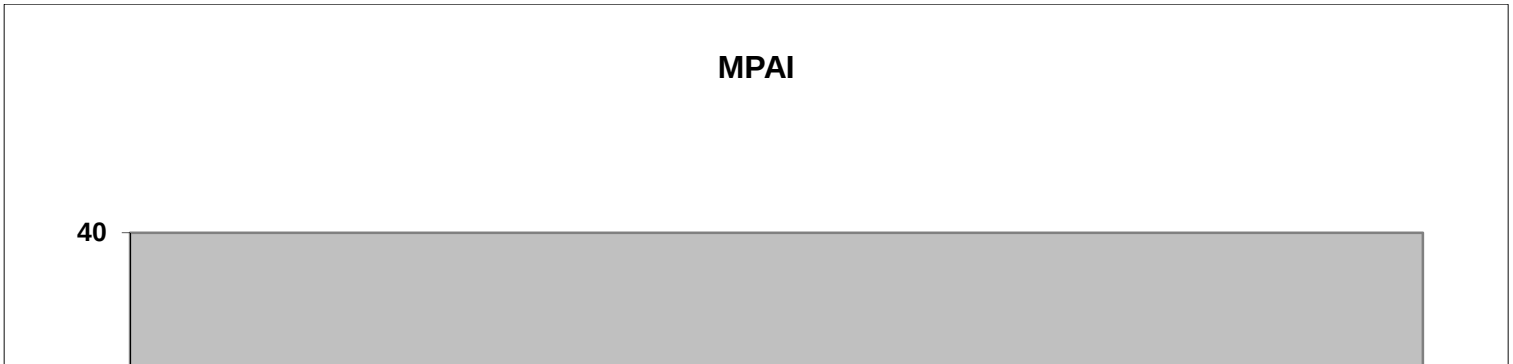
	Pre test		Post test	
	MEAN	SD	MEAN	SD
Control Group	49.93	49.33	2.43	2.69
Experimental Group	50.2	51.87	2.36	2.69



GRAPH-2

MUSIC PERFORMANCE ANXIETY INDEX(MPAI) BETWEEN GROUPS COMPARISON

	Mean	SD
Control Group	30.93	1.87
Experimental Group	28.2	1.42



CHAPTER-5

RESULTS

5.0 RESULTS

This study was done for 30 subjects which consist of 15 subjects in Control and experimental group respectively with the study duration done for 7 hours intra-day.

Paired samples statistics data of Cervical Range of motion(In degrees) shows a significance of 0.23 to Control group in comparison to 0.49 for experimental group. The increased ROM of cervical flexor shows an implied reduction of PRMD on cervical muscles of Violinists belonging to Group-B. Besides, Independent samples test on MPAI with a mean difference of 2.73 signifies the reduced anxiety level on Group-B and thereby PRMD.

The result on analysis between the groups shows a significance of $p < 0.05$ proving that Alternate Hypothesis is valid.

CHAPTER-6

DISCUSSION

6.0 DISCUSSION:

As studied & rightly quoted by Christine Zaza[11], Performing arts medicine especially Playing related musculoskeletal disorder is one of the most under researched subject in the contemporary era of Physiotherapy. This statement stands absolutely valid to Indian Literature context, as the word "Performing Arts Medicine" remains unknown to many of the practising Healthcare professionals in India. Good news is, As such, "Ergonomics" as a stream of speciality is gaining popularity among both healthcare practitioners and common man.

Height of ignorance is, Even musicians who undergoes the said "Playing related Musculoskeletal disorder" doesn't realize the terminology[9], it's effects and ways to overcome it. They hardly complain about their physical discomfort due to playing and assumes that, this discomfort is short lived and they will soon overcome it without any medical intervention. But the fact remains that, They have learnt to live with their bodily discomfort without taking preventive care to prevent deterioration.

Journey of this study, will make one to realize, how effective is preventive healthcare than a reactive intervention measure. Though there are mention about self stretching& postural re-education as a prevention strategy in several literature articles. When these are applied to young budding violinists, not just the statistical significance, but also perceptually heart warming response is seen among musicians. Even if it's applied for a day's practise, if this study can show a marginal difference, just imagine the positive influence of these preventive strategies adopted by musicians throughout their career.

There is a specific reason for choosing Cervical neck flexor group, Unlike Western method of playing orchestral Violin, Classical Carnatic Violinists tend to play the instrument by flexing their neck to hold the instrument on their chin throughout the concert. To worsen this, there is also a non paradox Slough sitting posture with a completely cross legged sitting coupled with arm movements to handle bowing. In all true possibilities, the above said posture is least recommended for a musician who is going pursue their career as Violinist in future and play for significantly longer hours.

Indeed, Cervical flexor muscles is one of the aspect in Violinists to study about and it's the pronounced region of discomfort perceived and experienced by musicians[8] & hence brought in to scope of this study. Subsequently, other regions with respect to playing can also be studied to understand its influence on musicians.

Thus this study not just proves the statistical significance of self stretches& postural re education in reducing PRMD of cervical flexors among classical carnatic violinists, but also has shown the potential for literature studies based on these topic lines. It has always been believed that, reduced Mortality rate is not fruitful until there is a reduction in morbidity.

Stevenson Kaza[7], also states in his study conclusion that, Given the increasing cases of occupational illness &reduced productivity, work based health hazards are the biggest threat to our human kind and irony is, Musicians who intend to entertain their audience with their best efforts in performance land up

hurting themselves. In nut shell, this defines the in depth meaning of "Playing Related Musculoskeletal Disorder" and how significant and necessary for it to be avoided .

CHAPTER-7

CONCLUSION

7.0 CONCLUSION

The result of the study concludes that, there is a Marginal difference in reduction of PRMD of Cervical neck flexors seen in Group B with violinists given with the Intervention of Self - stretches & Postural Re education given than the Group A with Musician under the conventional method of playing violin.

CHAPTER-8

LIMITATIONS & RECOMMENDATIONS

8.1 LIMITATIONS

- The duration of the study was very less.
- Reduction of PRMD only on cervical flexors was studied, Shoulder, Hand and spine were not brought under the scope of the study. .

8.2 RECOMMENDATIONS

- This study can be done for a longer duration with a large sample size.
- Stretching & Postural re- education must be applied for a longer duration and observed to see whether it makes a even better outcome & influence in reduction of PRMD.

CHAPTER-9

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9.0 BIBLIOGRAPHY

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CHAPTER-10

APPENDIX

APPENDIX -1

Music Performance Anxiety Inventory for Adolescents (State) (MPAI-A-State; Osborne, 2012)

Published in Braden AM, Osborne MS and Wilson SJ (2015) . Psychological intervention reduces self-reported performance anxiety in high school music students. *Front. Psychol*.**6**:195. doi: 10.3389/fpsyg.2015.00195

WHAT I THINK ABOUT PERFORMING MUSIC

A number of statements which people use to describe themselves before a performance are given below. Please read each statement and then select the number that indicates how you feel RIGHT NOW, AT THIS VERY MOMENT.

There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

		Not at all					All of the time
1.	I have butterflies in my stomach.	0	1	2	3	45	6
2.	I am worried about my ability to perform.	0	1	2	3	45	6
3.	I am trembling and/or shaking.	0	1	2	3	45	6
4.	I am afraid of making mistakes.	0	1	2	3	45	6
5.	My heart is beating very fast.	0	1	2	3	45	6
6.	I am finding it hard to concentrate on my music.	0	1	2	3	45	6
7.	If I make a mistake during this performance, I will panic.	0	1	2	3	45	6
8.	I have sweaty hands.	0	1	2	3	45	6
9.	I feel nervous.	0	1	2	3	45	6
10.	I am worried that the judges will not like my performance.	0	1	2	3	45	6
11.	My muscles feel tense.	0	1	2	3	45	6
12.	I think I will be happy with this performance when I am finished.	6	5	4	3	21	0

APPENDIX-2

INFORMED CONSENT FORM FOR STUDY PARTICIPATION

Subject Consent Form to Participate in the Research Study

This is to acknowledge & express my consent that, I volunteered on my own to participate in a study titled

"An Experimental Study to analyze the Effects of Self stretching and Postural Re Education Program for Classical Carnatic Violin Artistes in reducing Playing Related Musculoskeletal Disorder(PRMD)of Neck Muscles".

I was told in detail about the nature of the study, its intention and possible consequence(if any) and out of my own decision would like to participate & thereby, if any beneficial finding made, contribute to the welfare of the Carnatic Musicians at large.

Date : Signature

Place :